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*Zygnema*, *Spirogyra longa*, *S. inflata*, *S. conspicua*, and *S. punctata*, illustrating an increasing sexual differentiation, that culminates in *Sirogonium sticticum*, in which there is not only a difference between the mother cells of the gametæ, but a difference in size between the latter after their renovation previous to union.

### Some New Grasses.

BY GEO. VASEY.

**ELYMUS ORCUTTIANUS.**—Culms generally several from one root, 2 or 3 feet high, rather slender, leafy; nodes 4 to 5: leaves 8 to 10 inches long, erect but not rigid, narrow and more or less involute when dry, scabrous on the margins, upper leaf equalling or exceeding the culm; sheaths striate, smooth; ligule a short ciliate line or nearly obsolete: spike 4 to 6 inches long, erect, loosely flowered, with 15 to 20 spikelets, two or frequently only one at each joint, mostly flat and 2-ranked: spikelets 5 to 7-flowered; outer glumes linear-lanceolate, rigid, long-pointed, 4 to 6 lines long, one or indistinctly three-nerved, equalling or exceeding the lower flowers; lower flowering glumes 4 to 5 lines long, rigid, lanceolate, acuminate, rounded and smooth on the back, finely punctate, 5-nerved on the inside, the point scabrous; the upper flowering glumes gradually shorter and less pointed, and more scabrous above; palea  $\frac{1}{4}$  to  $\frac{1}{3}$  shorter than the glumes, 2-toothed at apex, 2-keeled, the keels ciliate.

This is one of those species which may with almost equal propriety be classed in *Elymus* or *Agropyrum*. The narrow rigid glumes, and the general position of the spikelets seem best to refer it to *Elymus*, although in the weaker plants the spikelets are single.

Collected near San Diego, California, by *C. R. Orcutt*.

**AGROPYRUM TENERUM.**—Culms in tufts or patches, without running rootstocks, apparently annual, about 3 feet high, erect, smooth: leaves narrow, one or two lines wide, 3 to 6 inches long; sheaths striate, smoothish; ligule short: spike slender, cylindrical, 4 to 6 inches long, one or two lines wide, with the spikelets  $\frac{1}{3}$  to  $\frac{1}{2}$  inch distant, sometimes wider and with the spikelets closer; axis scabrous: spikelets 3 to 5-flowered; outer glumes 5 to 6 lines long, rigid, lanceolate, acute or awn-pointed, strongly 5-nerved; flowering glumes lanceolate, acute, 4 to 5 lines long,

rounded on the back, smooth or smoothish and with the nerves indistinct below, above conspicuously 5-nerved and scabrous, terminated with a stiff, straight awn  $\frac{1}{2}$  line to 2 lines long; palet nearly as long as its glume, entire or obtusely 2-toothed at the apex, the keels ciliate or hispid-ciliate.

This has been named in some collections *Triticum* (*Agropyrum*) *repens*, var. *tenerum*. It is often difficult to distinguish it from that species except in wanting the running rootstock. It is common throughout the Rocky Mountains, and in bottom lands it is often cut for hay, of which it makes an excellent quality.

Another very common *Agropyrum* of the mountains and plains, also valuable for forage and hay, and known among stockmen from Montana to New Mexico as "blue stem, or blue grass," is the *Agropyrum glaucum*, R. & S. of which the following is a description:

AGROPYRUM GLAUCUM, R. & S.—Culms from running rootstocks, 1 to 3 feet high, erect, rigid, smooth, with about 3 erect, rigid, narrow leaves, 4 to 6 inches long: spike distichous, 4 to 6 inches long, 4 to 6 lines wide, generally close or compact: spikelets 5 to 9-flowered, smoothish or sometimes pubescent; outer glumes slightly unequal, narrowly lanceolate, acuminate or awn-pointed, the lower 4 to 5 lines, and the upper 5 to 6 lines long, the lower 1 to 3-nerved and the upper about 5-nerved, the lateral nerves mostly all on one side of the midrib; flowering glumes 4 to 6 lines long, lanceolate, obtusish, or acute, or awn-pointed, usually sparsely pubescent, 5-nerved, the nerves indistinct below; palet about equalling its glume, rather acute, slightly bidentate, the keels hispid-ciliate, the back sparsely softly pubescent.

The whole plant is usually glaucous. In rich soil the spikelets are sometimes double at the joints.

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### Lowest Germination of Maize.

BY E. LEWIS STURTEVANT.

At the New York Agricultural Experiment Station we have obtained the following data relating to the germination of maize. The temperatures given are of a thermometer with the bulb in with the seed used, and each degree carefully corrected with a standard. Readings were taken hourly from 7 A. M. to 11 and 12